Origin of Structure in Disks

Pawel Artymowicz
(Email: pawel@astro.su.se)
Stockholm Observatory, Stockholm, Sweden

Planetary systems form inside gas and dust disks, which are evolving in time from the stage of primordial solar nebula to the low-mass debris disk stage such as around β Pictoris. The resolved disks typically have features ranging from abrupt radial variation of density (or slope of density) with only a slight degree of asymmetry (main disk of β Pic, HR 4796A, Fomalhaut), to puzzling off-centered blobs (e.g., Vega, ϵ Eridani, β Pic) or quasi-spiral structures (HD 141596A, AB Aur, HD 100546). We review the main ideas about the physics behind the nontrivial structure (i.e., structure other than the simple power-law axisymmetric disk so often invoked by theorists) in disks. While perhaps the most exciting models propose that the gravity of hypothetical planets gives disks their structure, complementary mechanisms include the interaction of dust grains with the residual gas and stellar radiation, and/or the grain-grain collisions.